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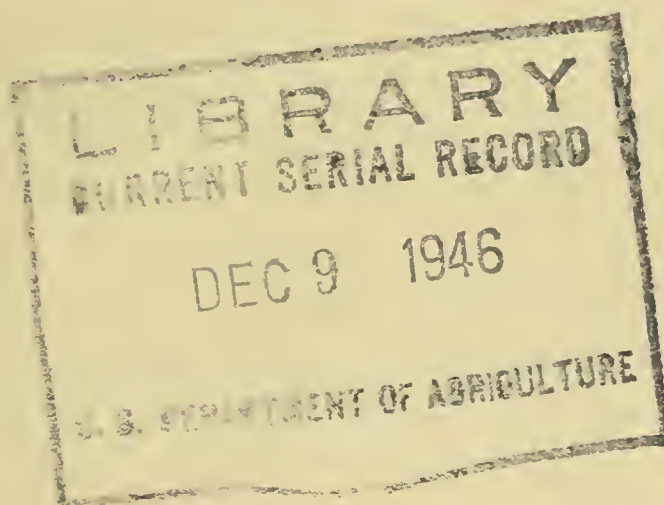
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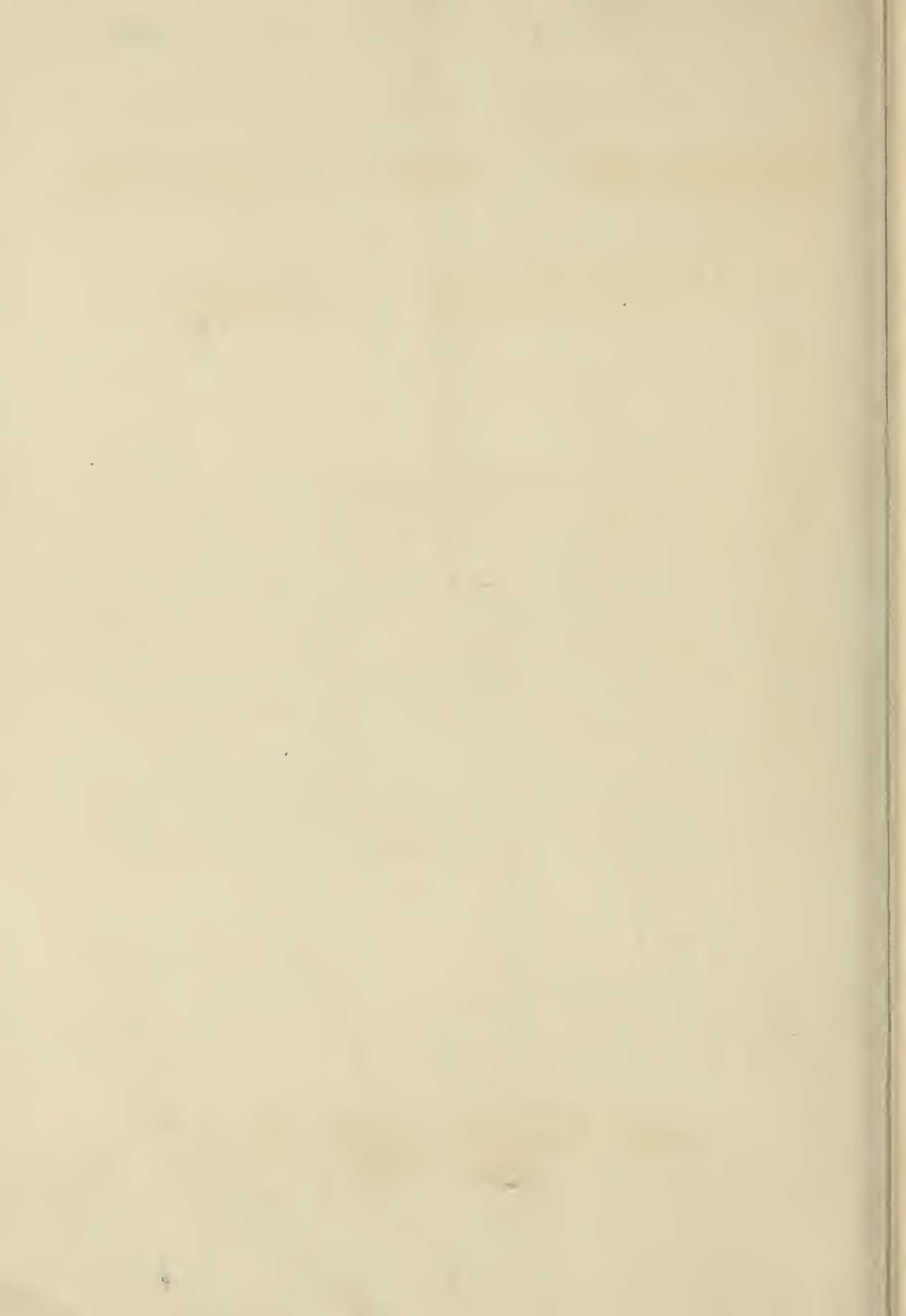
CLEARING AND RESEEDING SAGEBRUSH LANDS

by

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CLEARING AND RESEEDING SAGEBRUSH LANDS

BIG SAGEBRUSH (*Artemesia Tridentata*)

Millions of acres of range land in the intermountain area today are offering farmers and ranchers only 10 to 50 percent of the range feed they are capable of producing. Large areas formerly covered with palatable grasses and shrubs now support only sagebrush and cheatgrass.

There is a way for many ranchers who are short of range feed to improve their ranges and have plenty of feed in a few years. By reseeding land now in sagebrush and cheatgrass to crested wheatgrass or other good grass species they can maintain their livestock in better condition, produce heavier calves or lambs, raise larger calf or lamb crops and heavier wool clips, sustain a smaller death loss, and gain more effective control of erosion.

Several years of experience with clearing and reseeding western sagebrush lands has proved that the process can be successful by several different methods and that it is distinctly profitable.

For best results, sage clearing and reseeding go hand in hand. Clearing removes much of the competition from sagebrush and other plants, making it much easier for seeded grass seedlings to establish themselves.

There are many reasons why one method of clearing and reseeding is better in one instance and in one location than it is in others. This bulletin explains some of them.

HOW TO CLEAR IT

Plowing

Possibly the most common method of clearing sage is with the wheatland plow. This method is adapted to slopes under 20 to 30 percent and to soils moderately free from rocks.

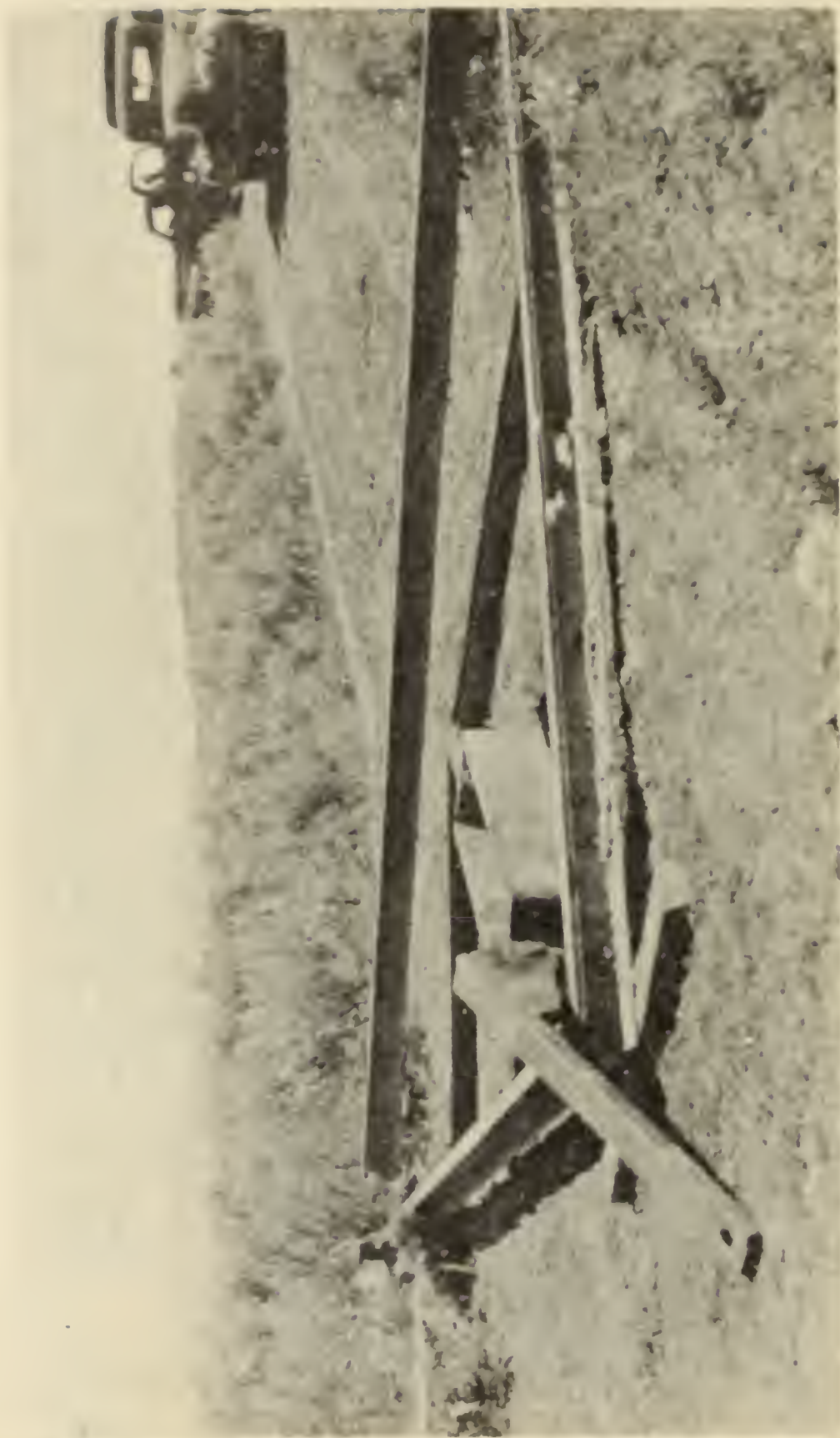
When to do it---The best kills are usually obtained when soil is moist, therefore spring plowing is preferred. The soil settles to a firmer seedbed after spring plowing than it does after fall plowing, and there is a greater reduction of cheatgrass if plowing is done before its seed matures. If large areas are to be cleared, however, the entire spring, summer and fall seasons are satisfactory for clearing. Good jobs of plowing usually give an 80 to 90 percent kill of sage.

What to use---The most commonly used unit for plowing sage is a 35 to 40-horsepower crawler-type tractor with a 9 to 10-foot disc plow. A unit of this type operated by the San Juan Soil Conservation District clears from one to three acres an hour. A farm tractor which can pull a 3 or 4-bottom plow when a 6 to 8-foot disc plow is attached also makes a well-matched unit. It will clear from one to one and a half acres an hour.

Hoitt Moss, a cooperator with the East Juab Soil Conservation District, who has used the latter combination, reported that sage did not cause excessive wear on rubber tires.



PLOWING. Here is a wheatland plow being used to clear sagebrush. This ten-
~~foot~~ plow is pulled with a 40-horsepower crawler-type tractor and will clear
two to three acres an hour. The picture was made near Benmore, Utah.



RAILING. This is an "A"-type rail used for sage clearing.
Forest Service picture.

Most operators agree that 26-inch discs are preferable to smaller sizes, and would try bigger discs if they were available. Heavily cupped discs are preferable, and strong construction is desirable throughout.

Railing

Railing of sage is faster than wheatland plowing and therefore less expensive. The kill of sage is somewhat less effective in railing than in plowing or burning, but most of the native perennial grass is left alive to help fill in and replace the sage. Small, flexible sage plants and rabbitbrush are passed over by the rail. Therefore, this type of treatment is most effective in stands of large, mature sage plants. The sage kill usually ranges from 60 to 80 percent.

Large anchored stones cause delays and excessive breakage but are less troublesome in railing than in plowing. Experimental work in Oklahoma indicates that small, thin-stemmed sage may be cleared by mowing. It may be that mowing after railing may help control small sage and rabbitbrush, giving a better kill.

Railing is especially effective when 15 percent or more of the cover is composed of desirable grasses. In this case, reseeding may not be necessary.

One Man's Story---Nick Churnous, who lives near Huntsville, Utah, has increased perennial grass by 300 percent in four to five years after treatment by railing, and has only 30 percent as

much sage on the railed area as on the unrailed land. He prefers to rail in the fall after grazing, since this interferes less with range use and better kills are obtained when the sage is more brittle. Mr. Churnous likes to rail across in one direction, then turn back and rail the same strip in the opposite direction.

How He Did It---Mr. Churnous helped develop what the Forest Service calls the "Monte Cristo"-type rail. The front rail is 30 feet long and made up of three 75-pound rails fastened together. Two 14-foot rails are dragged behind the front rail. The trailing rails are composed of two 75-pound rails fastened together. Mr. Churnous tried this outfit with a 55-horsepower crawler tractor on a measured block of land and found that it will cover about five acres an hour, covering all of the land twice.

The Forest Service is trying an "A"-shaped rail using two 15-foot rails to form the "A". This rail makes a 21-foot swath and can be pulled with a 35-horsepower tractor. The outfit is reported to cover six acres an hour, or three acres an hour when railing in two directions. This rail is considered to be better than the Monte Cristo rail.

Burning

One of the oldest means of sage clearing is burning. Fire is a dangerous tool, however, and must be used with adequate precautions. Compliance with state fire laws is necessary. Under favorable conditions fire is a very cheap method

of clearing sage. It gives a high percentage of kill on sage, but practically no kill on rabbitbrush. Most grasses are not seriously damaged by fire, but some of them such as Idaho fescue are damaged.

On the Marchant ranch near Peoa, Utah, and on the East Hoytsville Cooperative Range near Hoytsville, Utah, extensive burns were successfully seeded in the fall of 1944. In both cases the fires burned over areas which could not be seeded, however, and to this extent tend to encourage rather than control erosion.

Danger!---Sage seedlings, rabbitbrush, and cheatgrass will often take over quickly after clearing and become thicker than before burning unless the area is protected from grazing and is reseeded. A case in point is a ranch near Coalville, Utah, where an early seeding of crested wheat was quite successful. On this area heavy use by sheep for three years has almost wiped out the crested wheat.

General recommendations in USDA Farmers' Bulletin No. 1948 should be followed. Controlled burning has proved satisfactory only on slopes and soils which can be drilled satisfactorily to perennial grasses.

Open stands of sage without a grass understory seldom can be burned because fire does not spread easily from one plant to the next. Coarse, granular soils may become a blow hazard after burning before seedlings can stabilize the area. Where blowing appears likely, other methods of clearing are preferable.

The Other Methods

Pipe harrows have been used successfully by the Forest Service in clearing land too rocky to permit the use of wheatland plows or rails. Present models are made of $\frac{1}{4}$ to 6-inch pipe 10 to 12 feet long through which holes have been bored. One to $1\frac{1}{2}$ -inch steel bars made from automobile axles are welded into the holes to form teeth. The teeth extend about 8 to 10 inches from the pipe. Pipes are dragged lengthwise in groups of eight to ten from a drawbar. A 35-horsepower crawler-type tractor will pull this outfit and clear about three acres an hour. Grass seed often is broadcast ahead of this machine in rough areas where drilling would not be practical.

Blading with a road maintainer or grader has been successful in clearing sage, and is especially good for clearing fireguards around areas to be burned. This method of clearing is thought to be a little slower than wheatland plowing. It was used in clearing 200 acres on the Benmore Soil Conservation Service Land Utilization Project this year, and the kill did not appear to be as good as it was on adjoining land cleared with a wheatland plow. If a deep enough cut is made to get a good kill, too much dirt is piled in the windrow with the sage.

At Monte Vista, Colo., a special blade 16 feet long has been attached to a 12-foot grader. The blade cuts the sage below the surface and allows dirt to waste over. This machine partially windrows sage for burning at the same operation. When pulled with a 70-horsepower crawler-type tractor, this machine will clear three acres an hour.

THE NEXT STEP--RESEEDING

If there is less than 15 to 20 percent of good perennial grass in the cover, adapted perennial grasses should be reseeded. In cases where more than 20 percent of good grass is mixed with the sage, good results have been obtained by raiiling or burning without reseeding. Even on these ranges, recovery probably would have been speeded by the seeding of desirable species not already present.

For best results, seeding should be done the first fall after clearing. To delay a year increases competition from cheatgrass, seedling sage plants, and other weeds, and makes seeding more difficult. No more land should be cleared than can be seeded during the first fall.

Drilling Pays---Drilling is preferred to broadcasting whenever drills can be used. This practice appears to give twice the stand with the same amount of seed. Semideep furrow drills (10-inch disc spacing) are preferred to flat drills (6 to 8-inch spacing) for general seeding. Furrow-type drills on the contour help control runoff and concentrate moisture for seedings on barren areas. Seed should not be covered more than one inch for wheatgrasses. Seeding too deep is a common error.

Broadcasting usually gives best results when seed is distributed ahead of the pipe harrow or other machine which helps to cover the seed lightly. Broadcasting in loose soil after wheatland plowing sometimes has given good results. Seeds

are covered as the loose soil settles back together. Several equipment companies make seeder boxes which mount on the wheatland plow. These boxes do what amounts to broadcasting when a board is placed under the spouts to cause the seed to fall behind the discs.

Charles Redd, of LaSal, Utah, who has done a large amount of reseeding, favors the use of a box mounted on the wheatland plow. He also believes that seed should be planted at the time of plowing regardless of the time of year, for a very special reason. Money saved by plowing and seeding in one operation will usually offset the cost resulting from occasional failures. Until Mr. Redd's theory has been proved, fall and winter planting usually should be followed.

Most experienced operators prefer fall or early winter drilling. However, Professor L. A. Stoddart of Utah State Agricultural College has found in several experiments that early spring plantings as soon as the ground can be drilled give results comparable with fall plantings.

Sage lands which are accidentally burned should be seeded wherever possible.

How Much Seed and What Kind?---Rates of seeding vary from about five pounds an acre at Grantsville, Utah, with a 10-inch rainfall, to eight pounds an acre around Monticello, Utah, with a 17-inch rainfall. Heavier rates are recommended for broadcasting.

Species most commonly used for reseeding are crested wheatgrass and smooth brome grass. Both

are plentiful, and seed is relatively cheap. Crested wheat is adapted to lower rainfall, south slopes, and lower elevations. Smooth brome is adapted to higher rainfall, north slopes, and higher elevations. Where both will grow, a mixture is desirable.

Slender wheatgrass and western wheatgrass are two native species widely adapted for reseeding in the sagebrush area, and are desirable for mixtures with crested wheat.

Tall wheatgrass (Agropyron elongatum) is a new species which shows excellent results in trial plantings from Tremonton and Tropic, on the north side of Utah, to Monticello, on the south. This grass promises to be even better than crested wheat. It seems to be easier and quicker to establish, more productive, and has a longer growing season than crested wheat. It should be included in mixtures wherever possible. Intermediate wheatgrass (Agropyron intermedium) is almost as good.

Other promising introductions now on trial are stiff-hair wheatgrass (Agropyron trichophorum), and Russian wildrye (Elymus junceus).

Planting ordinary rye or wheat (the cereals) with grass is to be discouraged. The cover crop furnishes more competition than protection in most cases. The feed produced also encourages too early use. If the operator definitely wants rye for quick pasture, it is better to make pure plantings and plant grass after the rye ceases to volunteer.

Planting sweet clover with grass at the rate of one to two pounds an acre is desirable.

Where seedings are to be made in an area covered by a dense stand of cheatgrass, there is a much greater chance of failure unless cheatgrass competition can be reduced. The Forest Service has had fair success from discing cheatgrass before it produces seed. Burning also helps. Professor Stoddart has conducted experiments which indicate that maximum reduction in cheatgrass is obtained by burning as early as the cheatgrass will carry the fire.

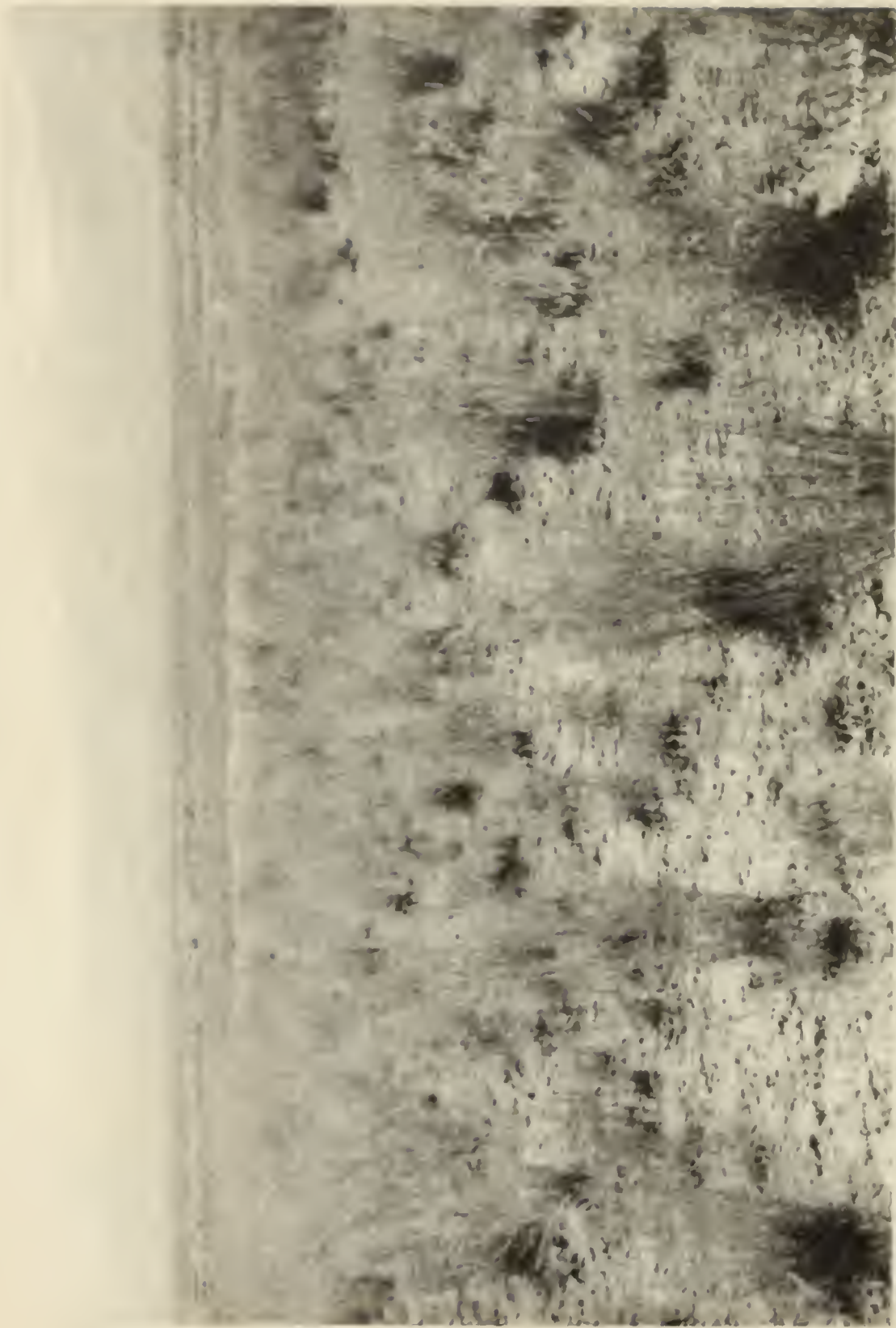
HELPING IT GROW

Seeded range land should be completely protected against grazing until seedlings are well established. This requires at least one year of protection under good conditions, and two to four years under less favorable conditions. The longer periods required for good establishment of the grasses are usually the result of heavy competition from cheatgrass. Other factors which lengthen the period of establishment are low rainfall, southern exposures, and poor jobs of clearing.

At Benmore, Utah, on the Soil Conservation Service Land Utilization Project, three to four years of complete protection were required to establish crested wheat in a stand of Russian thistle and cheatgrass under low rainfall conditions. Even after six years, the stands are still very spotted.



SAGEBRUSH LAND NEAR BENMORE. Forage production on this land is very low. More than ten acres of this land would be needed to feed a cow for a month.



CRESTED WHEATGRASS ON THE BENMORE LAND UTILIZATION PROJECT. Grazing records show that one acre of this pasture will produce enough grass to feed a cow for a month. The grass stand in the foreground appears thin, but it is keeping out cheatgrass and is therefore considered good for low rainfall areas.

After grass is established, care must be taken to avoid overuse. Limited experience indicates that crested wheat is damaged quicker by overuse than the native grass species. There is little point in going to the expense and trouble of clearing and reseeding if the new grass, like original cover, is to be destroyed by overuse. Under too heavy use, sagebrush, rabbitbrush, and undesirable weeds can be expected to increase and eventually dominate the range again.

Proper use is indicated by an average stubble height of four inches or more on crested wheatgrass at the end of the grazing season. Indications are that closer use will damage the vigor of range plants and lower forage production for coming years.

SUMMARY

Sage, clearing and reseeding of adapted grasses should increase range productivity two to ten times.

There are three main systems of clearing: wheatland plowing, railing and burning.

Wheatland plowing with a 35-horsepower tractor will cover about two acres an hour with a 80 to 90 percent kill of sage. Remnants of the native sod are killed along with the sage.

Railing with a 35-horsepower tractor will cover about three acres an hour with a 70 percent kill. When there are worthwhile remnants of native grass, railing is often preferable to plowing.

Burning is cheap, gives a 90 to 100 percent kill of sage, and leaves most of the native grass. It is a dangerous tool and must be adequately controlled.

Other methods include the use of pipe harrows, which are adapted to rocky soils, and blading, which is more expensive than wheatland plowing but is good for fireguards.

Drilling is preferred to broadcasting. Where there is 15 to 20 percent or more of good grass, the area should recover without seeding after mowing or burning if protected from grazing.

Seeding should be done the first year after clearing.

Seeding rates vary from five pounds an acre under low rainfall to eight pounds an acre in areas where rainfall is adequate for winter wheat.

Care after seeding is very important. One to three years of protection from grazing after clearing and seeding is required to establish grass.

After grass is established, it must be properly used. Under overuse the newly established grass is again crowded out by sage, rabbitbrush, and other weeds.

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